

WHAT IS CLAIMED IS:

1. A method for serving data comprising the steps of:
maintaining an incomplete version of an object at a

5 server;

maintaining at least one fragment at the server;

in response to a request for the object from a client,
sending to the client the incomplete version of the object,
an identifier for a fragment comprising a portion of the
10 object, and a position for the fragment within the object;

after receiving the incomplete version of the object,
the identifier, and the position, requesting, by the client,
the fragment from the server using the identifier; and

constructing the object by including the fragment in
15 the incomplete version of the object in a location specified
by the position.

2. The method of claim 1, wherein the client
comprises a cache.

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3. The method of claim 1, wherein the object
comprises a Web page.

4. The method of claim 1, wherein the step of
5 constructing further comprises the steps of:
determining whether a depth of inclusion relationships
in the object exceeds a threshold; and
in response to the depth exceeding the threshold,
abandoning constructing the object.

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5. The method of claim 4, further comprising the step
of increasing the threshold until the object is constructed.

6. The method of claim 1, further comprising the step
15 of maintaining a list of fragment identifiers corresponding
to inclusion relationships.

7. The method of claim 6, wherein the list of
fragment identifiers are included in a hash table, and

further including the step of examining the hash table each time the inclusion relationships change.

8. The method of claim 7, wherein the inclusion
5 relationships are stored in a list, and further comprising
the step of examining the list of inclusion relationships
when the list of inclusion relationships increases by a new
fragment to see if the new fragment has already been
encountered in the list of inclusion relationships.

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9. The method of claim 8, wherein if the new fragment
has already been encountered, concluding that a cycle
exists; otherwise, adding the new fragment
identifier to the hash table.

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10. The method of claim 9, further comprising the step
of after completing construction with the new fragment,
removing the new fragment.

11. The method of claim 6, further comprising
representing fragments by vertices in a directed graph, and
inclusion relationships by directed edges in the graph, the
method further comprising the step of determining if there
5 is a cycle in a list of inclusion relationships.

12. The method as recited in claim 11, wherein the
step of determining includes traversing a list of inclusion
relationships using two pointers.

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13. The method as recited in claim 12, wherein the two
pointers include a first pointer which traverses one
fragment at a time, and a second pointer which traverses two
fragments at a time, and if the two pointers meet in the
graph, determining that a cycle has been detected.

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14. A program storage device readable by machine,
tangibly embodying a program of instructions executable by
the machine to perform method steps as recited in claim 1.

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15. In a system including at least one server and at least one client, a method for serving data comprising the steps of:

maintaining at the at least one server, an incomplete
5 version of an object;

maintaining at the at least one server, at least one
fragment;

in response to a request for the object from a client,
the server sending to the client the incomplete version of
10 the object, at least one identifier for a fragment
comprising a portion of the object, and at least one
position for the fragment within the object;

the client receiving the incomplete version of the
object, the at least one identifier, and the at least one
15 position;

the client requesting the at least one fragment from
the at least one server using the at least one identifier;
and

the client constructing the object by including the at least one fragment in the incomplete version of the object in a location specified by the at least one position.

5 16. The method of claim 15, wherein the at least one client comprises at least one cache.

17. The method of claim 15, wherein the object comprises a Web page.

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18. The method of claim 15, wherein the step of constructing further comprises the steps of:

determining whether a depth of inclusion relationships in the object exceeds a threshold; and

15 in response to the depth exceeding the threshold, abandoning constructing the object.

19. The method of claim 18, further comprising the step of increasing the threshold until the object is
20 constructed.

20. The method of claim 15, further comprising the step of maintaining a list of fragment identifiers corresponding to inclusion relationships.

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21. The method of claim 20, wherein the list of fragment identifiers are included in a hash table, and further including the step of examining the hash table each time the inclusion relationships change.

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23. The method of claim 22, wherein the inclusion relationships are stored in a list, and further comprising the step of examining the list of inclusion relationships when the list of inclusion relationships increases by a new fragment to see if the new fragment has already been encountered in the list of inclusion relationships.

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24. The method of claim 23, wherein if the new fragment has already been encountered, concluding that a cycle exists; otherwise, adding the new fragment

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identifier to the hash table.

25. The method of claim 24, further comprising the
step of after completing construction with the new fragment,
5 removing the new fragment.

26. The method of claim 20, further comprising
representing fragments by vertices in a directed graph, and
inclusion relationships by directed edges in the graph, the
10 method further comprising the step of determining if there
is a cycle in a list of inclusion relationships.

27. The method as recited in claim 26, wherein the
step of determining includes traversing a list of inclusion
15 relationships using two pointers.

28. The method as recited in claim 27, wherein the two
pointers include a first pointer which traverses one
fragment at a time, and a second pointer which traverses two

fragments at a time, and if the two pointers meet in the graph, determining that a cycle has been detected.

29. A program storage device readable by machine,
5 tangibly embodying a program of instructions executable by the machine to perform method steps as recited in claim 15.

30. In a system comprised of a plurality of fragments in which a fragment may include another fragment, a method
10 for determining whether a set of inclusion relationships includes a cycle comprising the steps of:

examining a set of inclusion relationships to determine whether a depth of inclusions exceeds or equals a threshold;

if the depth exceeds or equals the threshold, using
15 graph traversal techniques to determine if a graph comprised of inclusion relationships includes a cycle;

if using the graph traversal techniques, no cycle is determined, incrementing the threshold and returning to the step of examining.

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31. The method recited in claim 30, further comprising the step of in response to the threshold exceeding or equaling an upper limit, terminating the step of returning to the step of examining.

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32. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps as recited in claim 30.